

**CLAIMS**

1. An electrical supply device (1, 1') intended to deliver energy to a structure (2) that includes at least two electrodes (20, 21) and a space containing a gas (24) intended to be excited, the device comprising a voltage generator (10), an inductor (41, 42, 40') connected to the generator (10) and connected to the structure in order to supply the two electrodes with a periodic voltage ( $V(t)$ ) of given frequency, characterized in that it includes what are called resonance means for fixing said frequency at substantially the resonant frequency  $f_R$  of the system, which consists of the structure (2) and said inductor (40', 42).
2. The supply device (1') as claimed in claim 1, characterized in that the inductor (40') is connected to one of the electrodes (20) and the resonance means comprise:
  - first and second switches (50a, 50b), the first switch (50a) being placed between the generator (10) and the inductor (40'), the second switch being connected to the first switch and to the other of the electrodes (21); and
  - means for controlling the switches (60'), these means being coupled to means (70') for measuring an image of the current passing through the structure (2), so as to fix said frequency.
3. The supply device (1, 1') as claimed in either of claims 1 and 2, characterized in that the voltage is at least partly sinusoidal.
4. The supply device as claimed in one of claims 1 to 3, characterized in that it includes means for truncating said voltage.
5. The supply device (1, 1') as claimed in one of claims 1 to 4, characterized in that the resonance means are capable of operating for a plurality of resonant frequencies.
6. The supply device (1') as claimed in claim 1, characterized in that it includes a transformer (40) provided with a primary winding (41) and with a secondary winding (42) forming said inductor, the primary winding being connected to the generator (10) and the secondary winding being connected to the two electrodes (20, 21), and in that the resonance means comprise a switch (50), which is placed in the path from the generator (10) to the primary winding (41) of the transformer, and a control system (60) connected to the switch (50) so as to open and close

the switch over a period  $T$ , the closing of said switch, which is closed for a duration  $dt$ , being triggered by choice at one of the following instants:

- at the zero crossing of the current flowing through the structure;
- when said voltage crosses a threshold voltage ( $V1$ ,  $-V1$ );
- 5     - at a threshold light level;
- when the current flowing through the structure crosses a threshold current.

7. The supply device as claimed in claim 6, characterized in that it includes means (70) for measuring the current that delivers, to the control system (60), an image of the current flowing through the structure, the closing of the switch within  
10 the period  $T$  being triggered at the current zero crossing.

8. The supply device as claimed in claim 6, characterized in that it includes means for measuring said voltage, said means being coupled to the control system, the closing of the switch within the period  $T$  being triggered when said voltage crosses said threshold voltage ( $V1$ ,  $-V1$ ).

15 9. The supply device as claimed in one of claims 6 to 8, characterized in that the duration ( $dt$ ) of the time during which the switch (50) is closed can be adjusted according to the energy to be delivered to the structure (2).

10. The supply device as claimed in one of claims 1 to 9, characterized in that said frequency is between 10 and 300 kHz, preferably between 40 and 50 kHz.

20 11. The use of the supply device as claimed in one of claims 1 to 10 for supplying at least two electrodes of a structure forming a flat lamp.

12. An assembly comprising:

- a structure (2) that includes at least two electrodes (20, 21) and a space containing a gas (24); and
- 25     - said supply device (1, 1') as claimed in one of claims 1 to 10.

13. The assembly as claimed in claim 12, characterized in that the structure (2) includes two dielectrics (22, 23) associated respectively with the two facing electrodes and spaced apart so as to create said space.

14. The assembly as claimed in either of claims 12 and 13 characterized in that  
30 the structure forms a flat lamp for a backlighting system or a flat lamp for architectural, decorative and/or indicating illumination.

15. The assembly as claimed in either of claims 12 and 13, characterized in that the structure forms part of a deposition system for a plasma CVD process.